FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Remote Controller

MODEL NUMBER: WUP-005

FCC ID: POO-R237999

REPORT NUMBER: 32JE0252-AP-01-A

ISSUE DATE: July 2, 2012

Prepared for
Mitsumi Electric Co., Ltd.
2-11-2, Tsurumaki, Tama-shi, Tokyo, 206-8567 Japan

Prepared by
UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
TEL: +81 596 24 8116
FAX: +81 596 24 8124

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/02/12	Initial Issue	T.Hatakeda

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

TABLE OF CONTENTS

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Mitsumi Electric Co., Ltd.
2-11-2, Tsurumaki, Tama-shi, Tokyo, 206-8567 Japan

EUT DESCRIPTION: Remote Controller

MODEL: WUP-005

SERIAL NUMBER: DP1001

DATE TESTED: June 21 to 28, 2012

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by any government agency.

Approved & Released For UL Japan, Inc. By:

Takahiro Hatakeda
Leader of WiSE Japan
UL Verification Services
UL Japan, Inc.

Tested By:

Yutaka Yoshida
Engineer of WiSE Japan
UL Verification Services
UL Japan, Inc.

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0
The full scope of accreditation can be viewed at
http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.1dB
No.2	3.3dB
No.3	3.7dB
No.4	3.2dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (±dB)			**Antenna terminal conducted emission (±dB)**		**Channel power (±dB)**
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth Remote control unit.

The radio module is manufactured by CSR.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	-0.08	0.98

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna with a maximum gain of −0.91dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was CSR BlueCore Bluetooth, v2.4.0.0.

The test utility software used during testing was CSR BlueTest3, v2.4 Release Build.

5.5. WORST-CASE CONFIGURATIONS AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the GFSK mode were made at 1 Mb/s.

The EUT was investigated in three different positions, X, Y, & Z and turned out the X (Horizontal), Y (Vertical) were worst-position. This worst position will be set for all radiated emissions testing.

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT FOR ALL TESTS EXCEPT FOR CONDUCTED EMISSION TEST

	PERIPHERAL SUPPORT EQUIPMENT LIST				
No.	**Description**	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
A	Switch Board	Mitsumi	-	-	N/A
B	Laptop PC	IBM	2373-L32	L3-NHT4A	DoC
C	AC Adaptor	IBM	08K8208	11S08K8208Z1Z9MA5686XR	N/A

SUPPORT EQUIPMENT FOR CONDUCTED EMISSION TEST

	PERIPHERAL SUPPORT EQUIPMENT LIST				
No.	**Description**	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
A	JIG	Mitsumi	-	-	N/A
B	AC Adaptor	Mitsumi	-	No.15	DoC
C	LCD Monitor	Ben Q	EW2730-B	ETNAB07468SL0	N/A

I/O CABLES FOR ALL TESTS EXCEPT FOR CONDUCTED EMISSION TEST

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical port**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	USB	1	USB	Shielded	2.3	-
2	USB	1	USB	Shielded	0.5	-
3	DC	1	DC	Unshielded	1.4	-
4	DC	1	DC	Unshielded	1.8	-
5	AC	1	AC	Unshielded	1.0	-
6	DC	1	DC	Unshielded	2.3	-

I/O CABLES FOR CONDUCTED EMISSION TEST

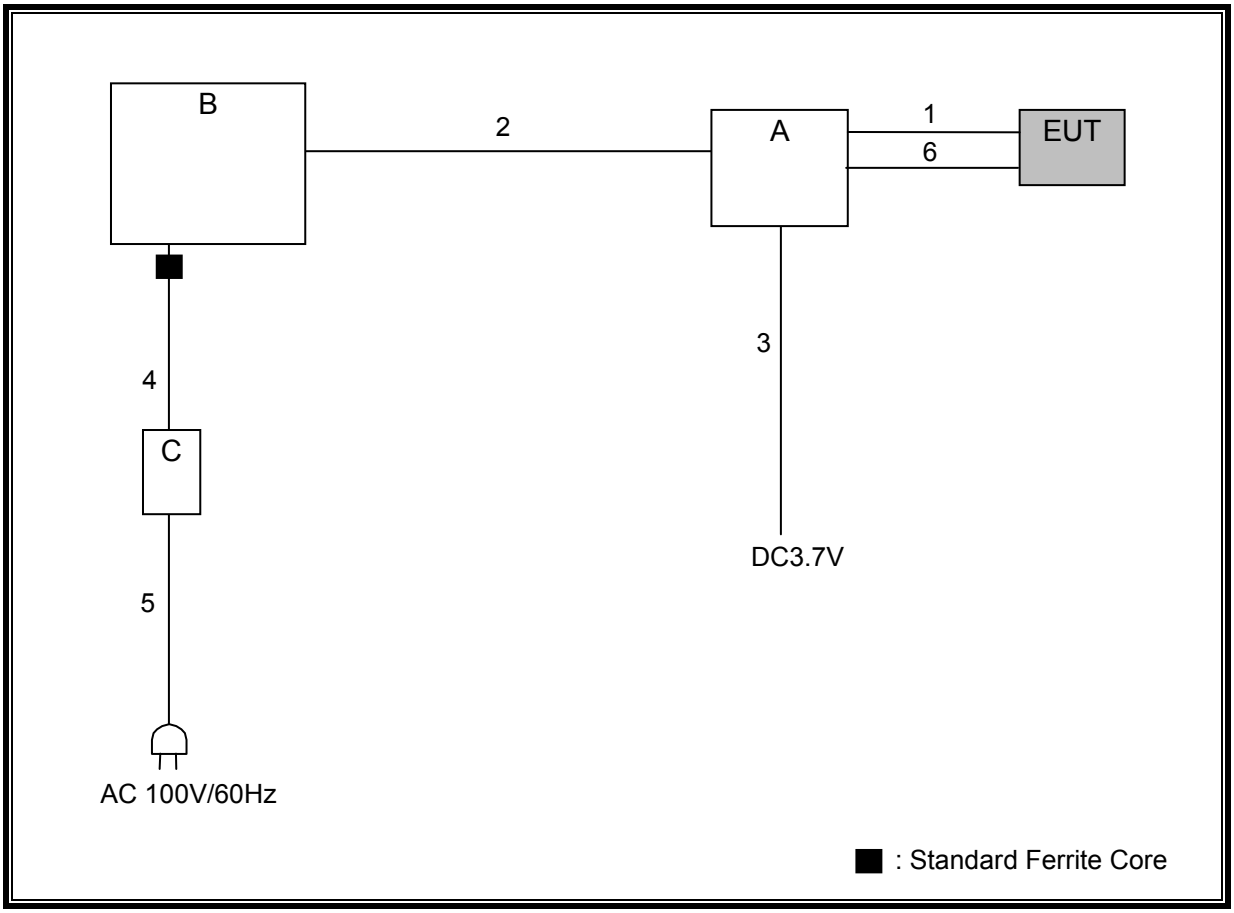
I/O CABLE LIST						
Cable No.	**Port**	**# of Identical port**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	USB	1	USB	Shielded	2.5	-
2	DC	1	DC	Unshielded	1.5	-
3	AC	1	AC	Unshielded	1.5	-
4	HDMI	1	HDMI	Shielded	3.0	-
5	AC	1	AC	Unshielded	1.8	-

TEST SETUP

The EUT is connected to a Jig board and host laptop computer via a USB cable during the tests. Test software exercised the radio module.

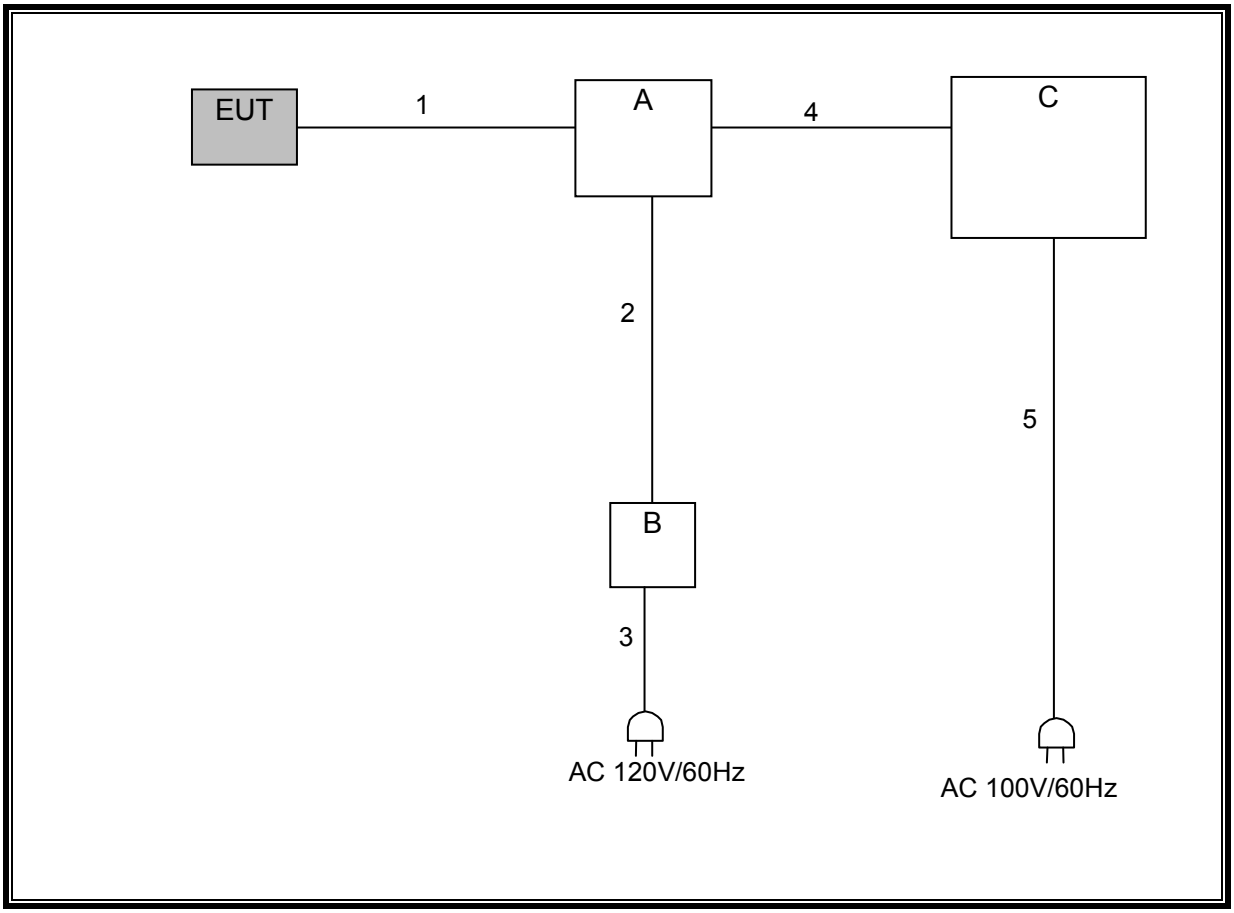
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

SETUP DIAGRAM FOR ALL TESTS EXCEPT FOR CONDUCTED EMISSION TEST



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

SETUP DIAGRAM FOR CONDUCTED EMISSION TEST



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT/RE	2011/11/23 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2011/09/13 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2011/09/13 * 12
MAT-19	Attenuator(6dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-106	-	AT	2012/01/12 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2011/10/28 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MMM-11	Digital HiTESTER	Hioki	3805	060100600	AT	2012/05/18 * 12
MDPS-12	DC Power Supply	Kikusui	PAK35-10A	LF002314	AT	Pre Check
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2011/08/11 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1203S212(1m) / 1204S062(5m)	RE	2012/04/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2012/03/28 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2011/06/17 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2012/02/03 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2012/04/05 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(AE)	2012/02/06 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2012/02/09 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2011/11/23 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform 141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2011/07/04 * 12

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.
Test Item:
RE: Radiated emission, CE: Conducted emission, AT: Antenna Terminal Conducted test

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6. ANTENNA PORT TEST RESULTS

6.1. BASIC DATA RATE GFSK MODULATION

6.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

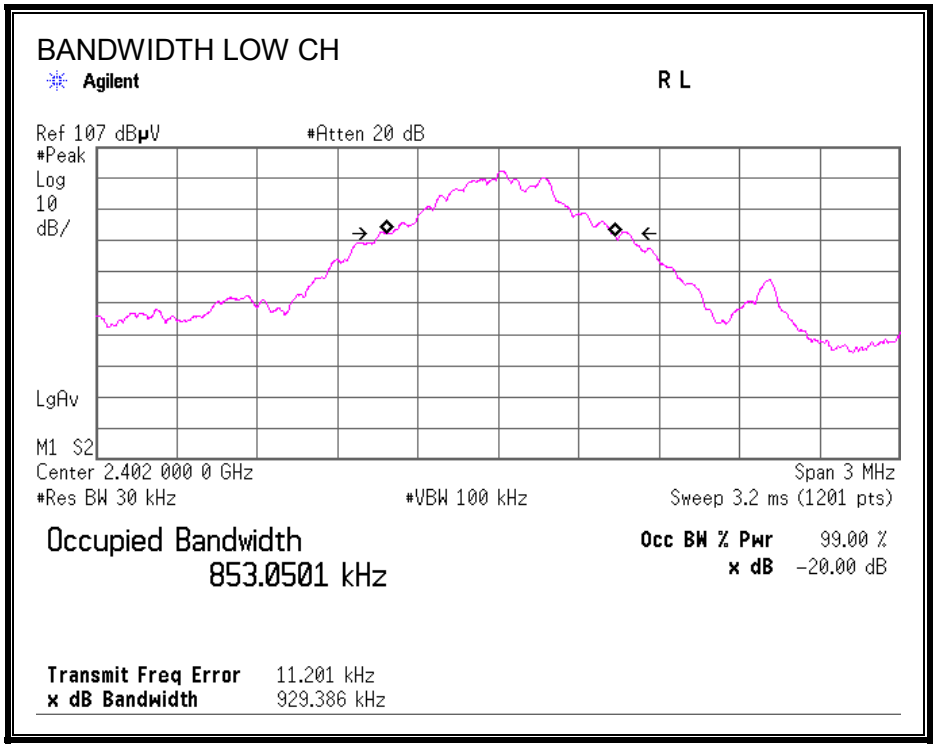
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

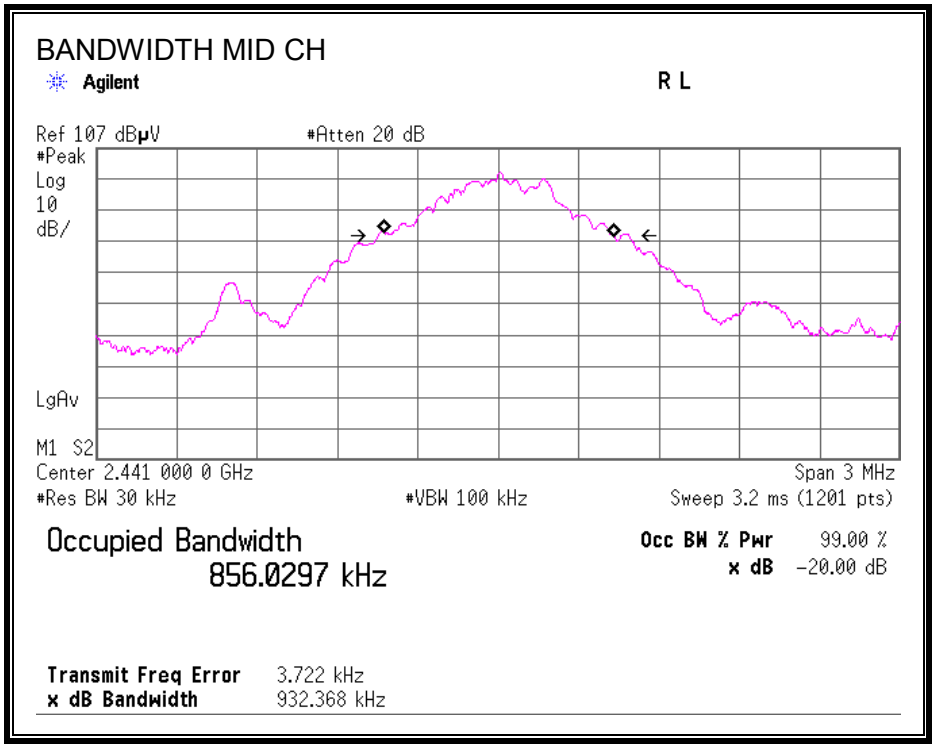
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	929.386	853.050
Middle	2441	932.368	856.030
High	2480	930.168	858.526

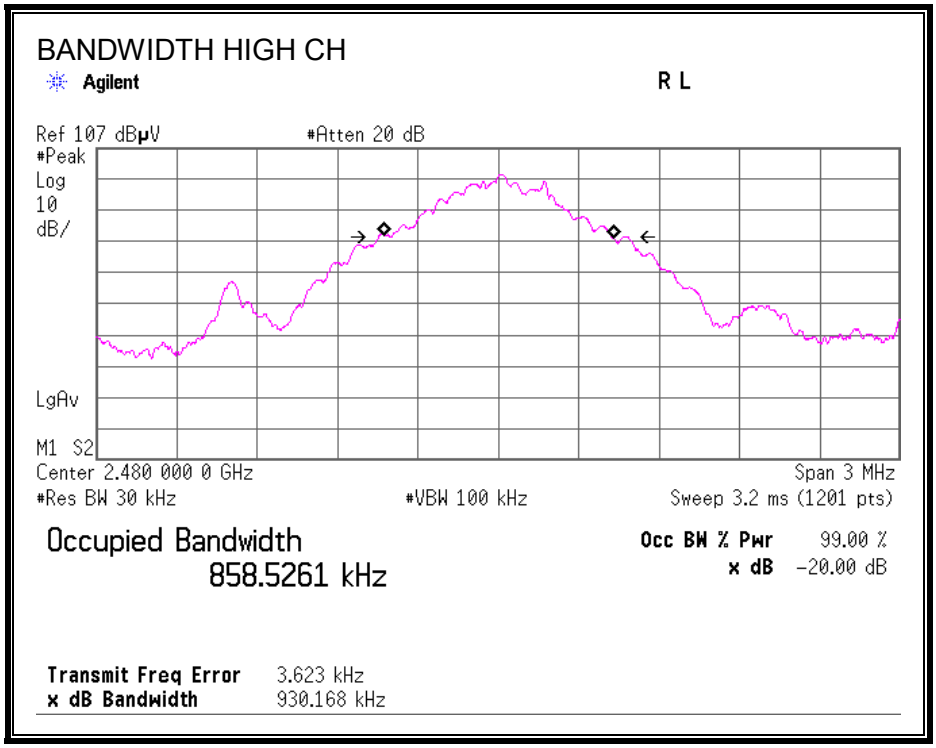
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

20 dB BANDWIDTH





UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

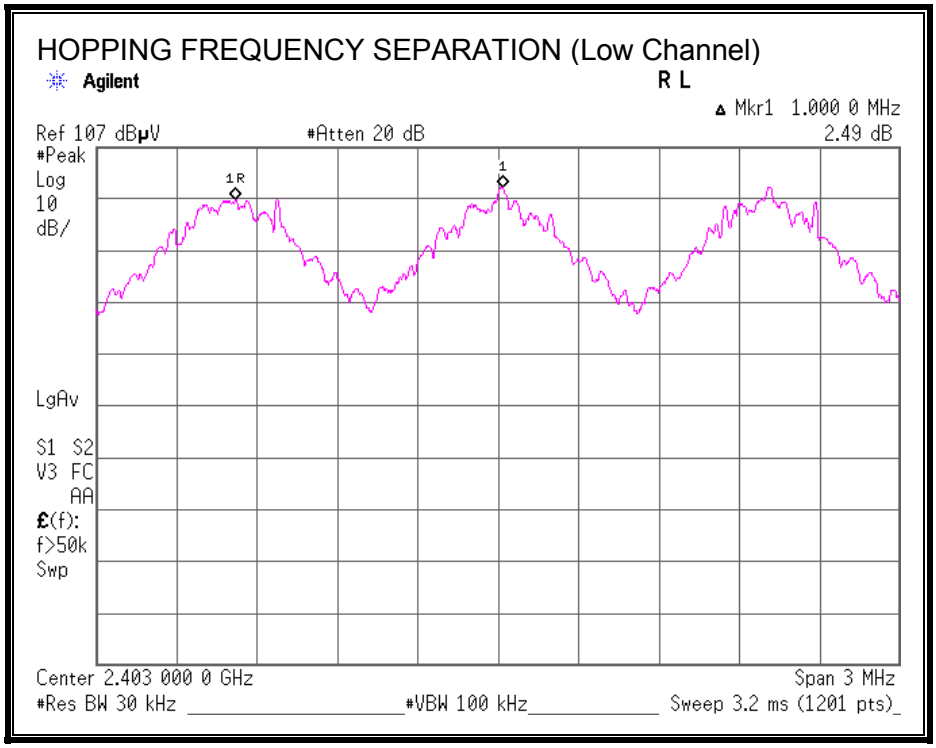
The transmitter output is connected to a spectrum analyzer. The RBW is set to 30 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

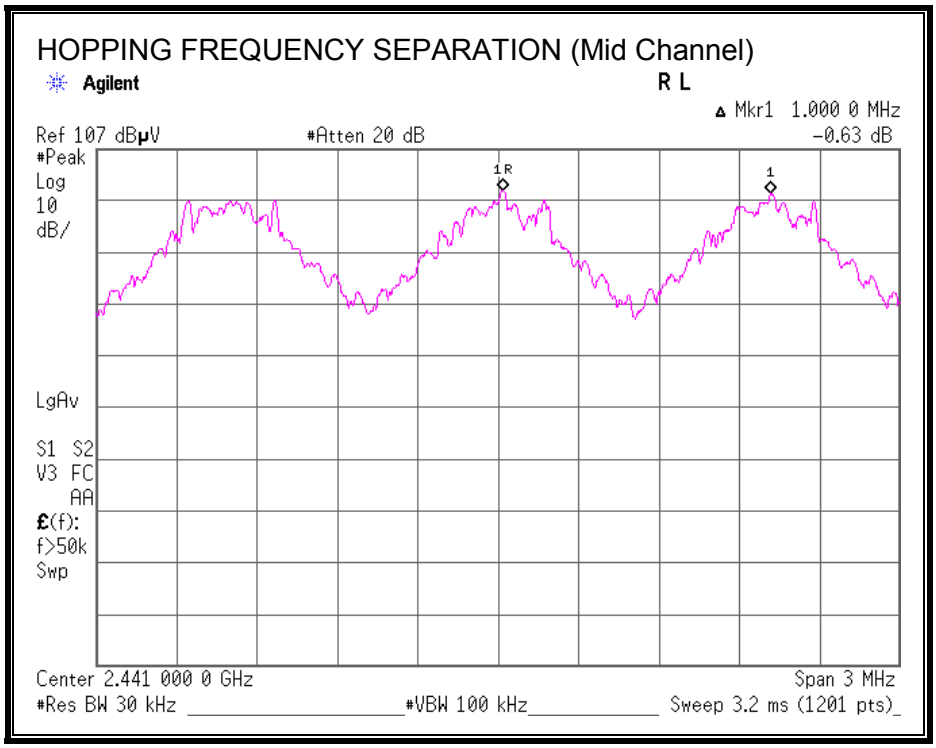
RESULTS

Pass

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

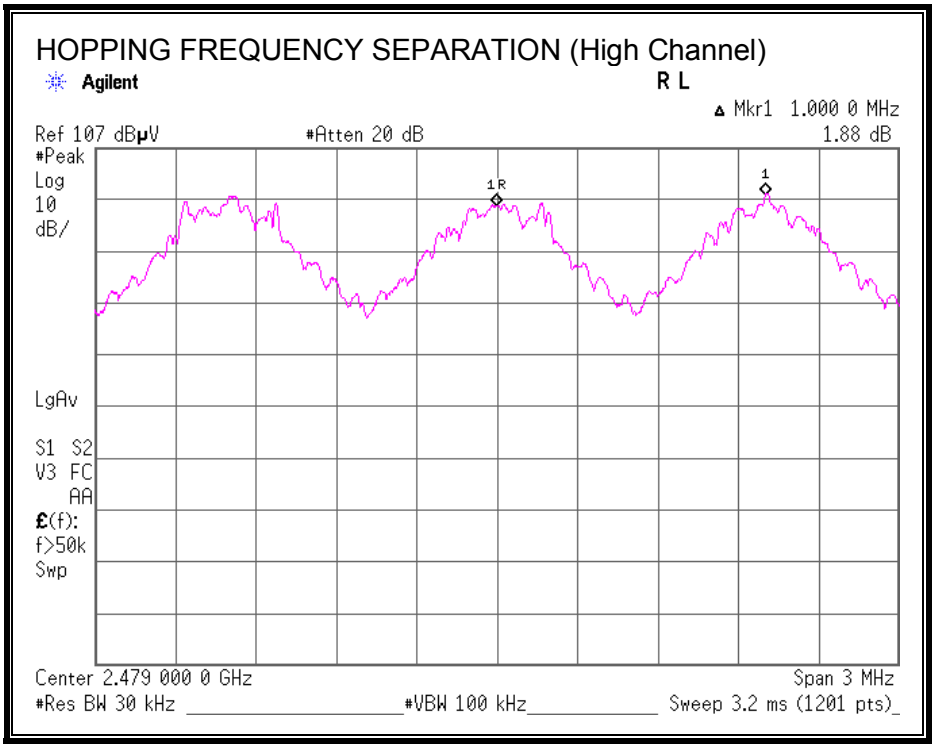
HOPPING FREQUENCY SEPARATION





UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

HOPPING FREQUENCY SEPARATION (High Channel)



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

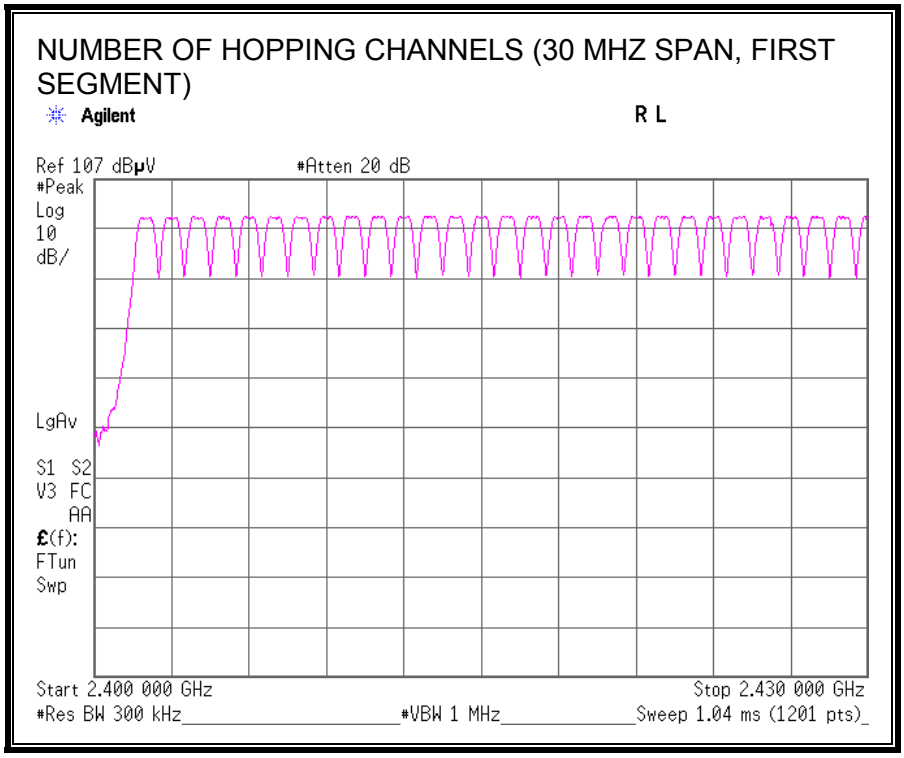
Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification 2.0.

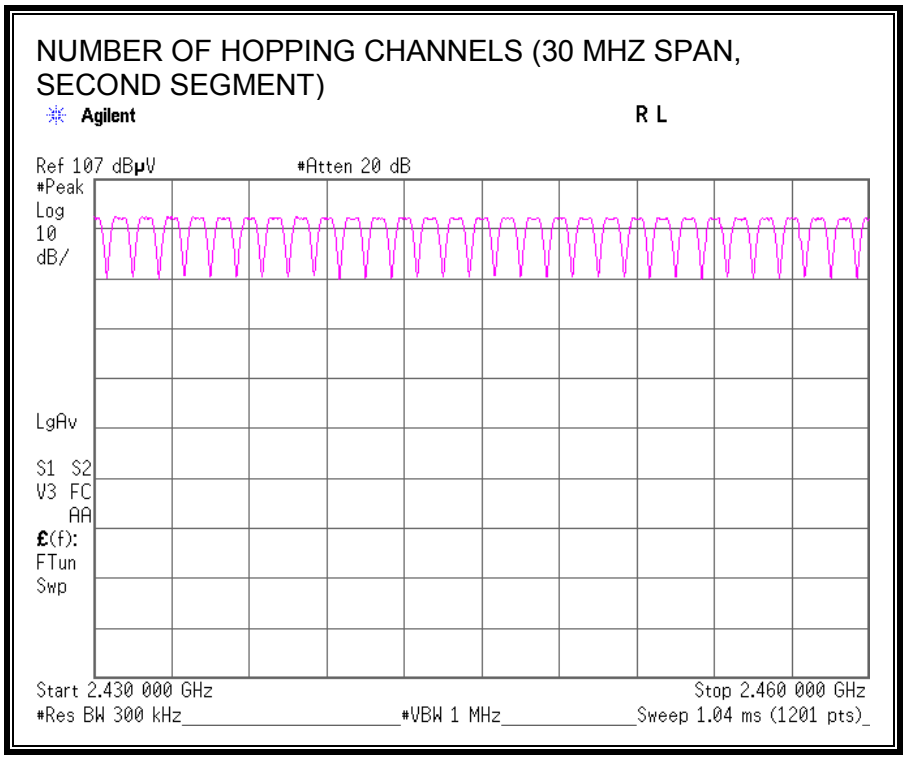
RESULTS

79 Channels observed.

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

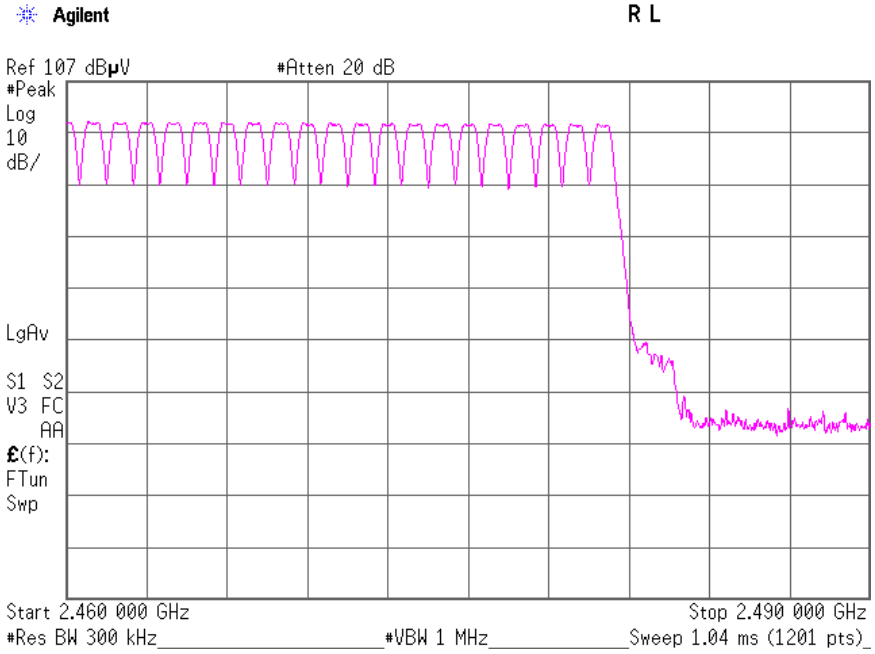
NUMBER OF HOPPING CHANNELS





UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 5 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 31.6 * (# of pulses in 5 s / 5 s) * pulse width.

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence (20 ≤ N ≤ 79), is always less than 0.4s regardless of packet size (DH1, DH3 or DH5). This is confirmed in the test report for N=79.

RESULTS

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.6 times / 5 sec. x 31.6 sec. = 320 times	0.524	168	400
DH3	25.6 times / 5 sec. x 31.6 sec. = 162 times	1.783	289	400
DH5	16.4 times / 5 sec. x 31.6 sec. = 104 times	3.033	315	400

Sample Calculation
Result = Number of transmission x Length of transmition time

*Average data of 5 tests.(except Inquiry)

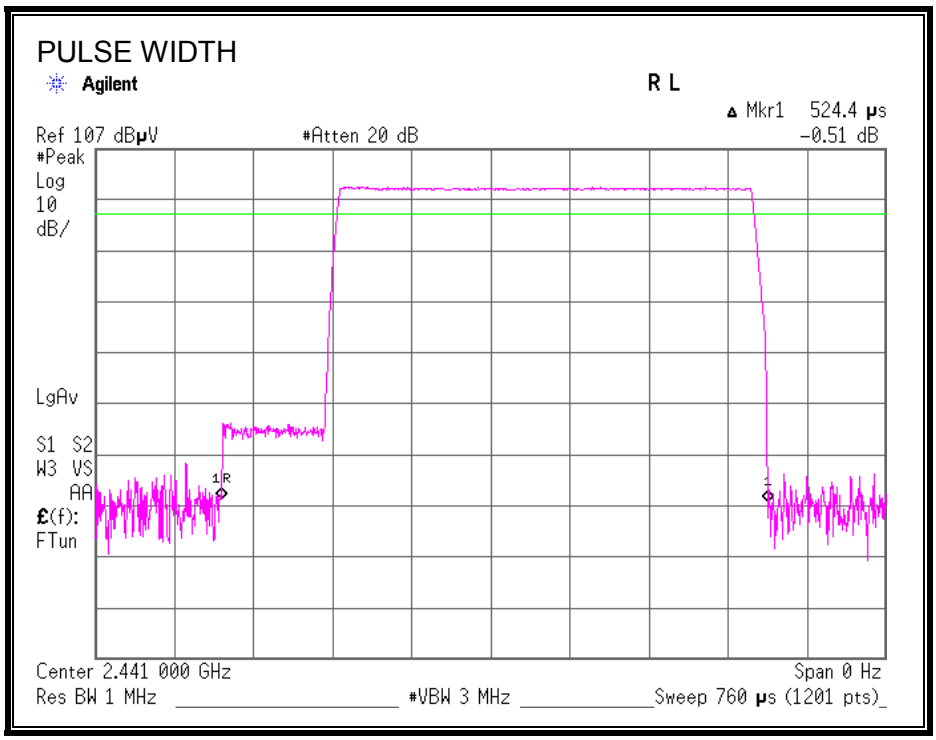
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	51	51	51	50	50.6
DH3	25	26	26	25	26	25.6
DH5	17	16	17	16	16	16.4

Sample Calculation
Average= Summation(Sampling 1 to 5) / 5

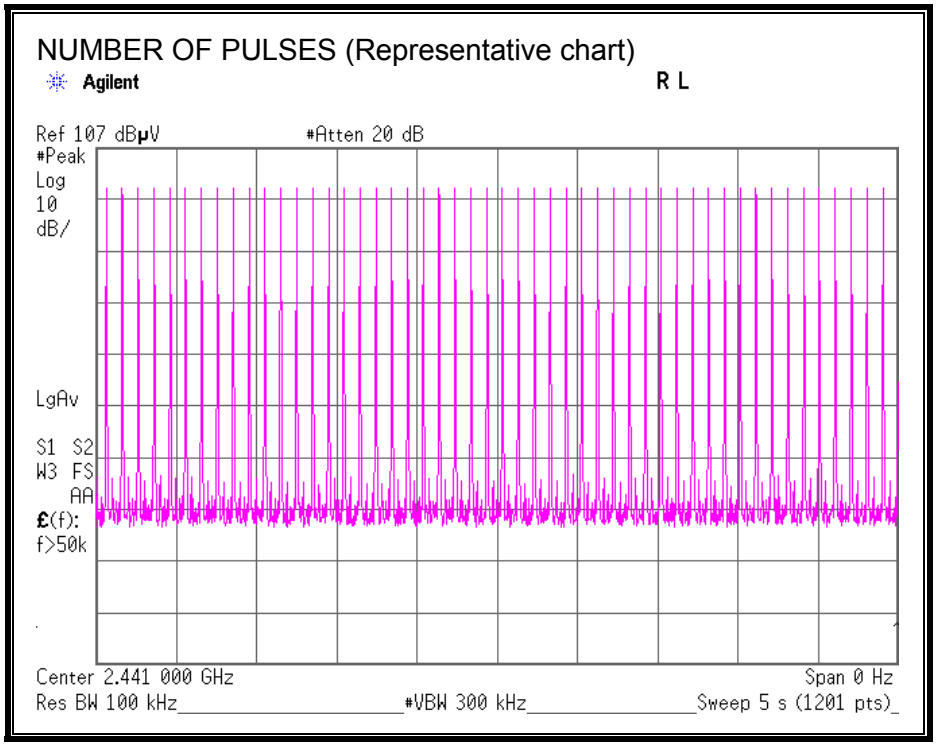
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

DH1

PULSE WIDTH



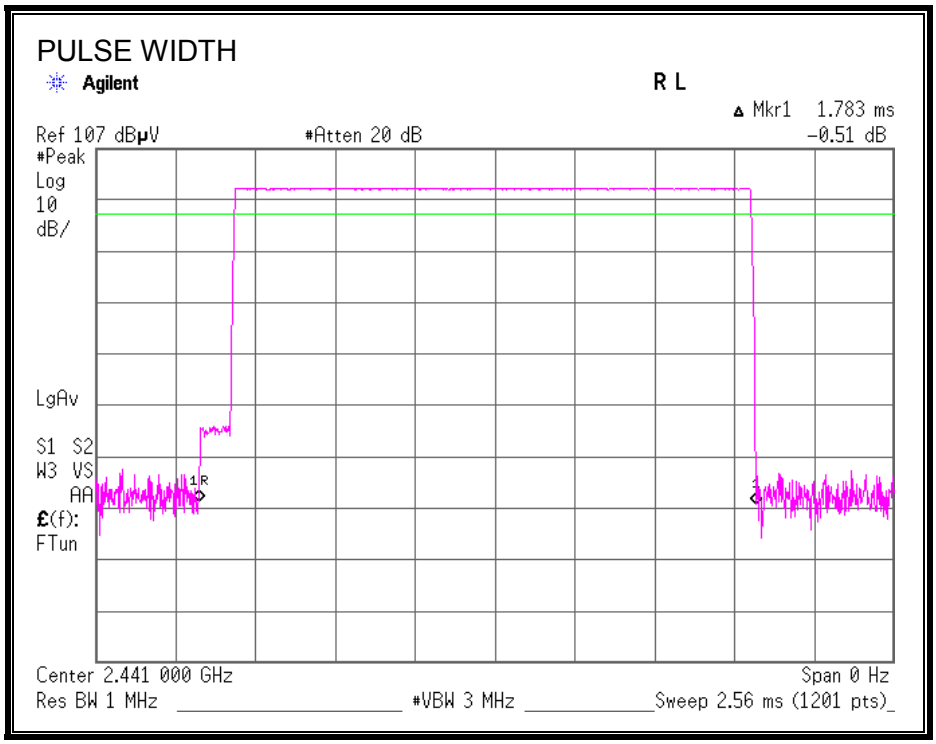
NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



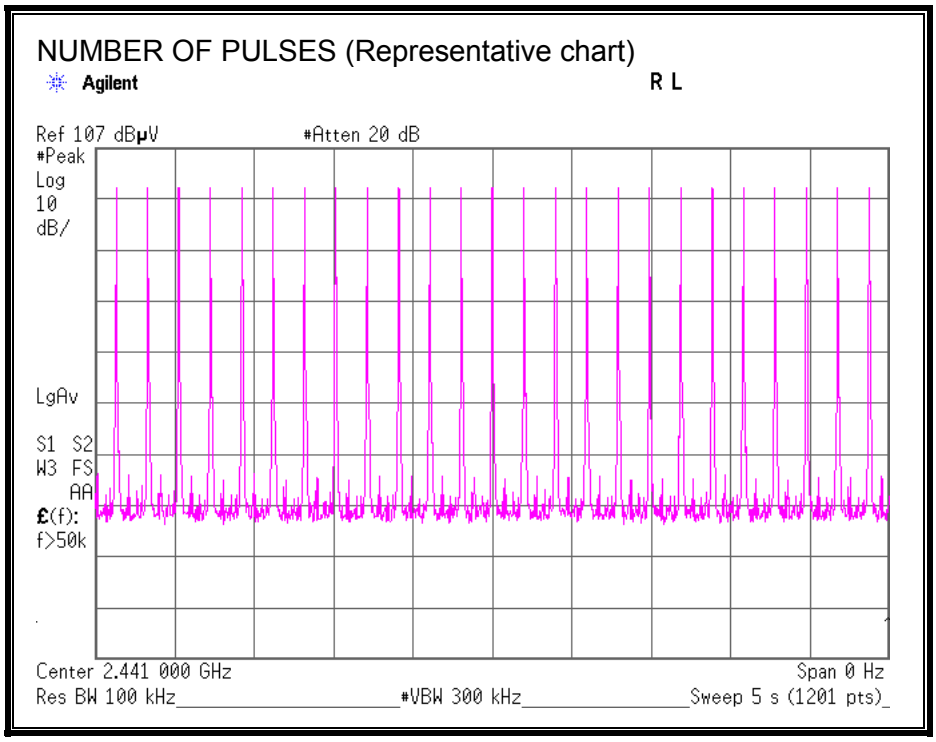
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

DH3

PULSE WIDTH



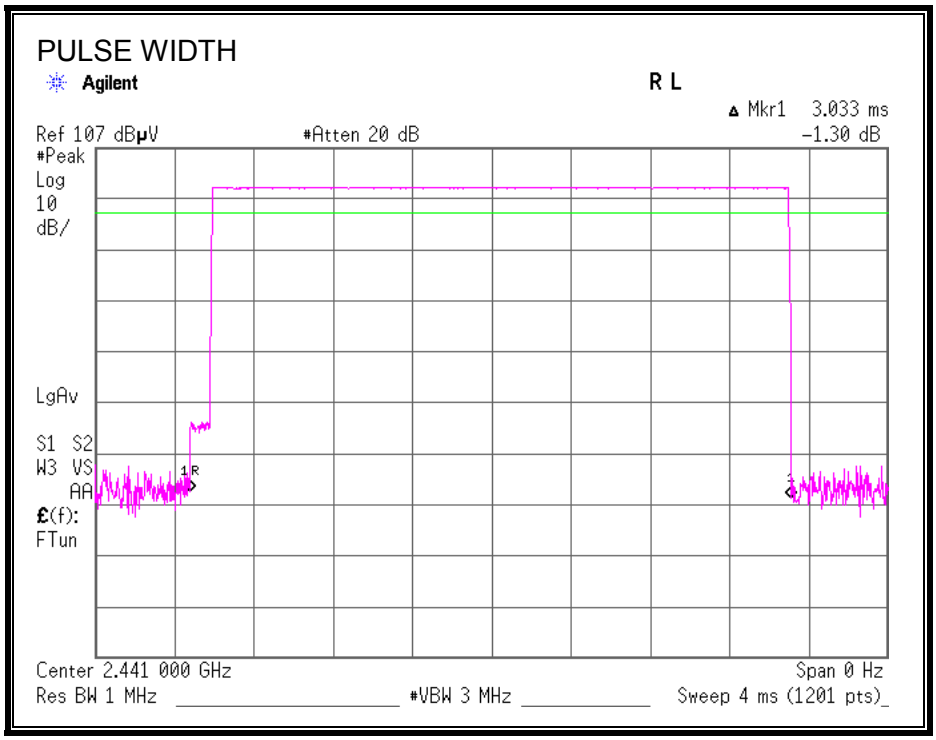
NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



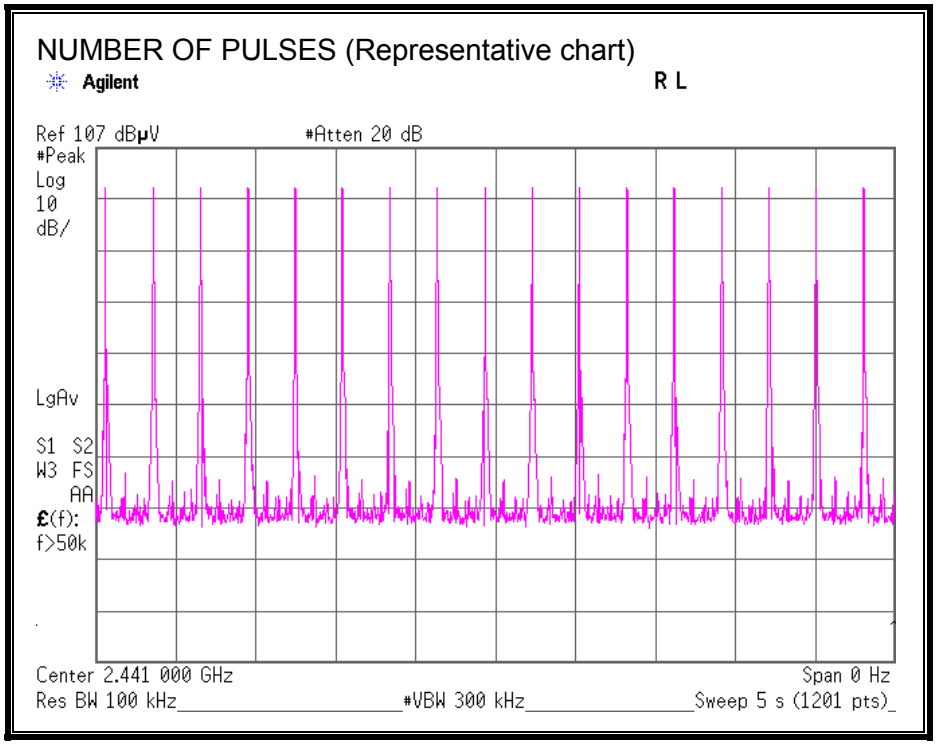
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

DH5

PULSE WIDTH



NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6.1.5. MAXIMUM PEAK OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.
Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
However, the limit level 125mW of AFH mode was used for the test.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Mode	Freq.	Reading Power Meter(PK)	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-7.62	1.43	6.11	-0.08	0.98	20.96	125	21.04
DH5	2441.0	-7.78	1.44	6.11	-0.23	0.95	20.96	125	21.19
DH5	2480.0	-8.32	1.44	6.11	-0.77	0.84	20.96	125	21.73

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Mode	Freq. [MHz]	Reading Power Meter(AV) [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
DH5	2402.0	-8.98	1.43	6.11	-1.44	0.72
DH5	2441.0	-9.10	1.44	6.11	-1.55	0.70
DH5	2480.0	-9.77	1.44	6.11	-2.22	0.60

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

6.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

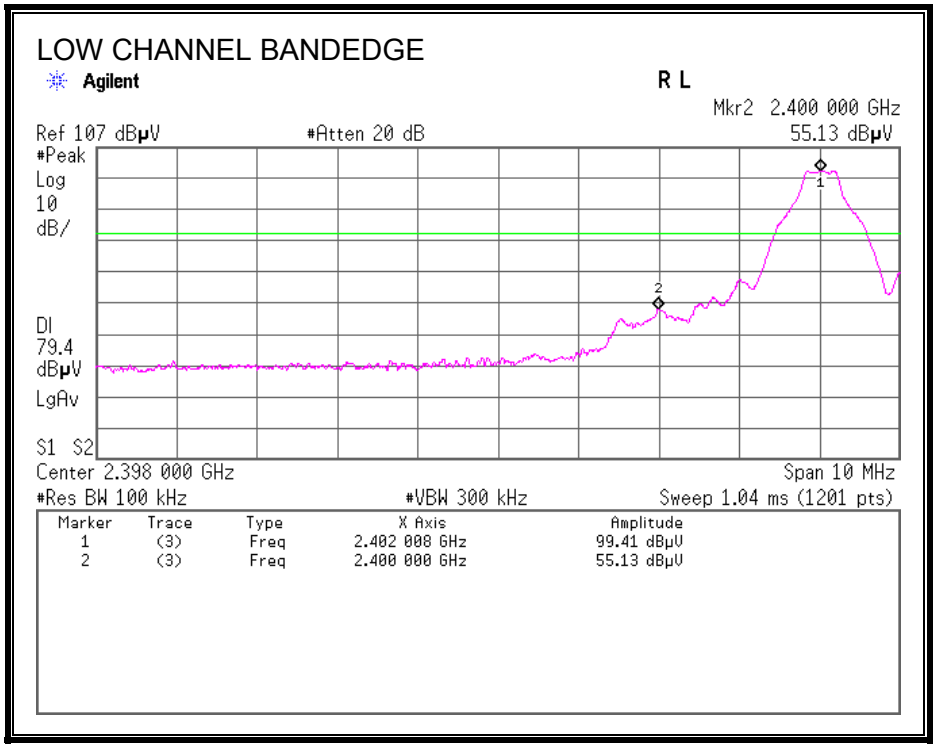
The spectrum from 9 kHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

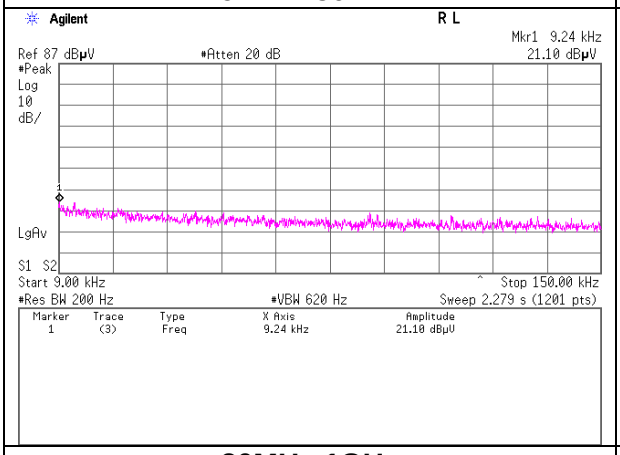
SPURIOUS EMISSIONS, LOW CHANNEL



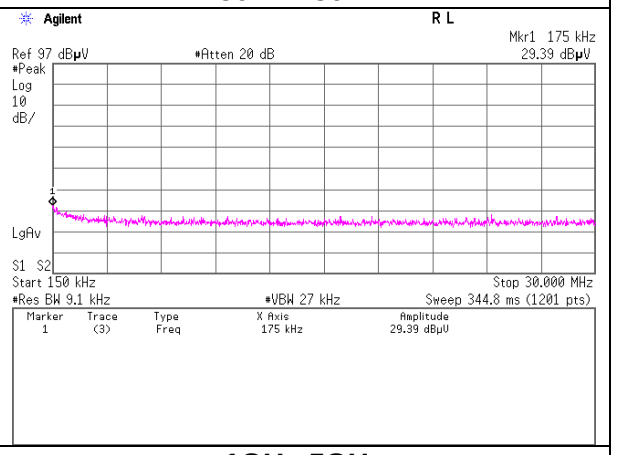
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Tx DH5 2402MHz

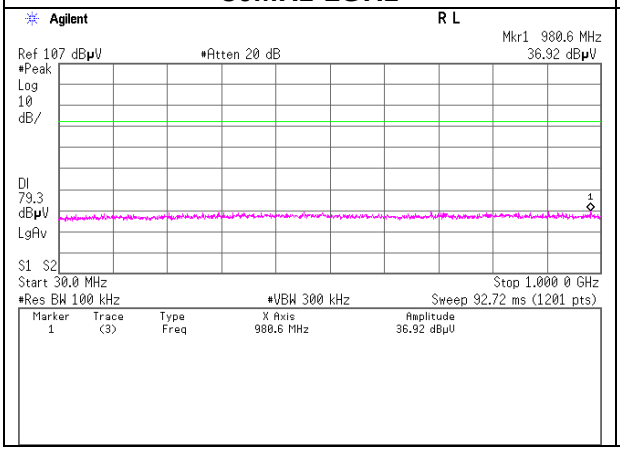
9kHz-150kHz



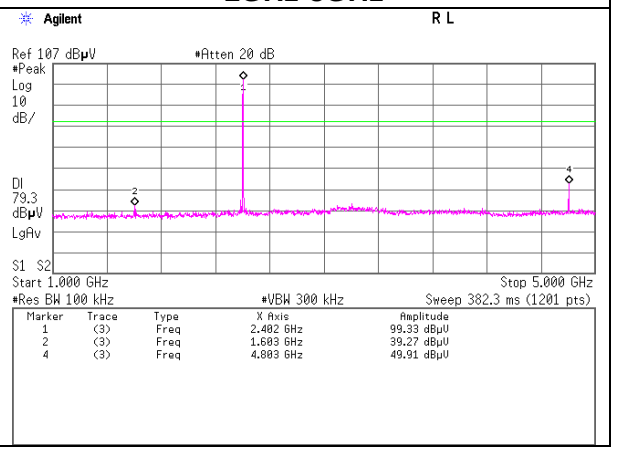
150kHz-30MHz



30MHz-1GHz



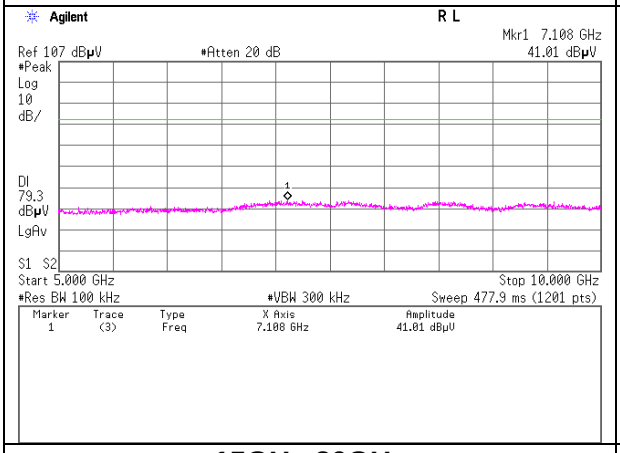
1GHz-5GHz



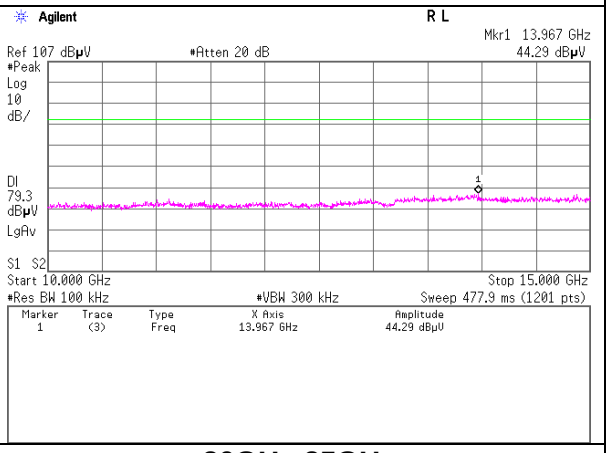
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Tx DH5 2402MHz

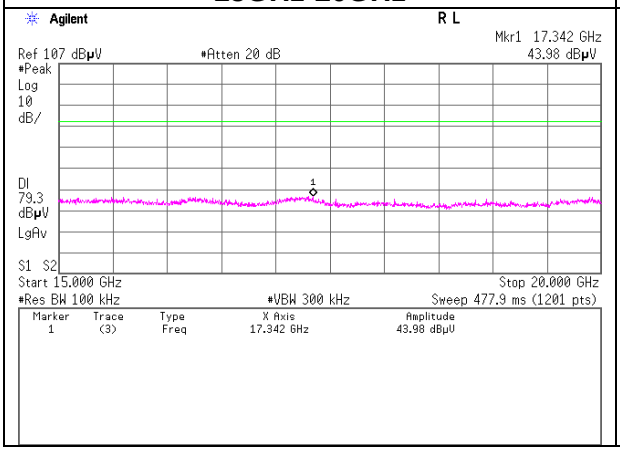
5GHz-10GHz



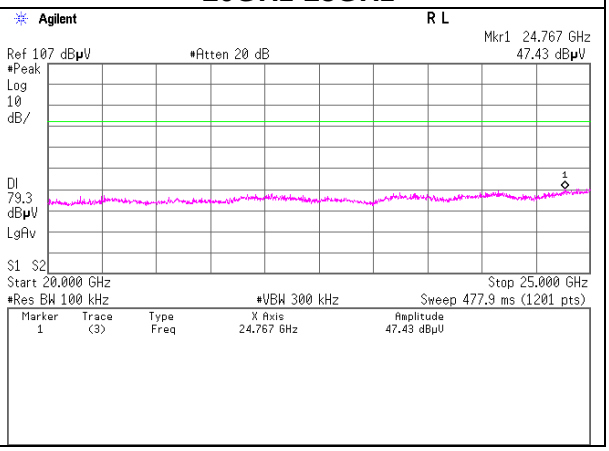
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz

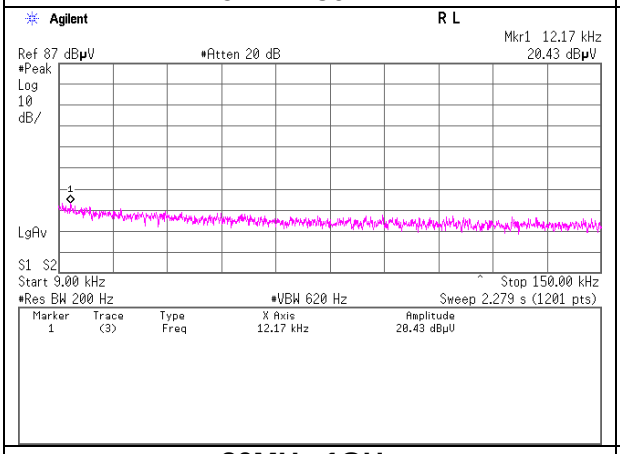


UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

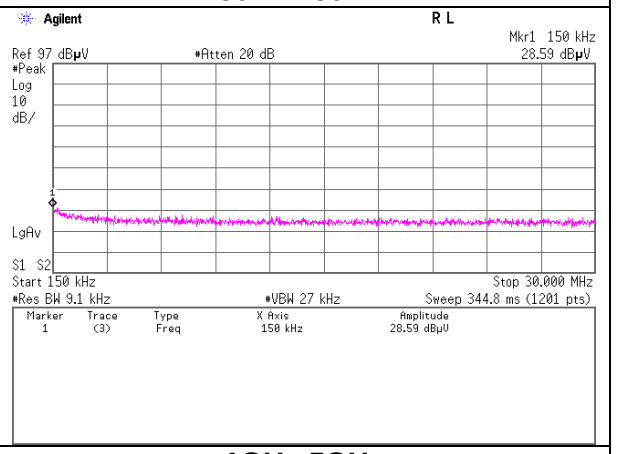
SPURIOUS EMISSIONS, MID CHANNEL

Tx DH5 2441MHz

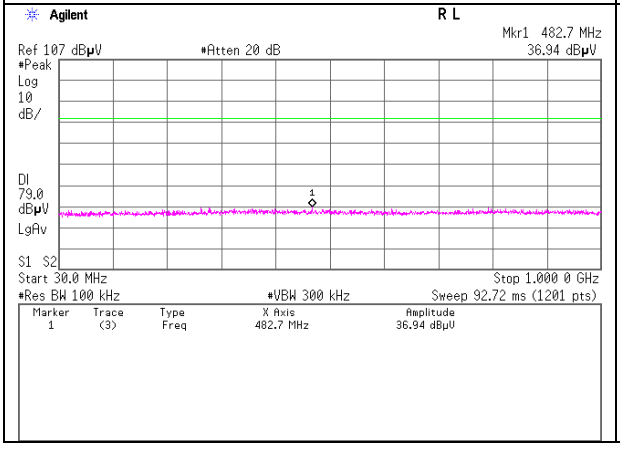
9kHz-150kHz



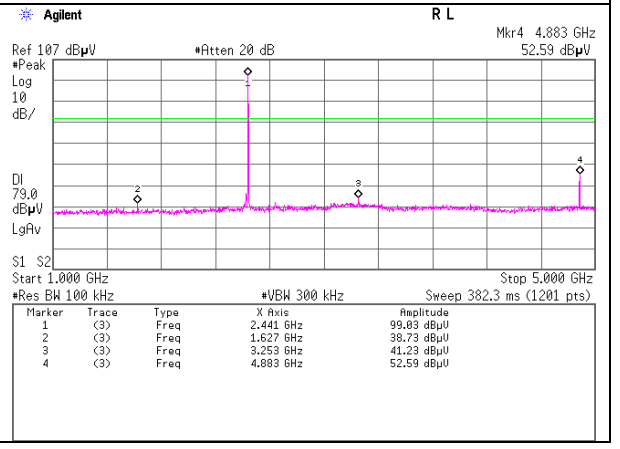
150kHz-30MHz



30MHz-1GHz



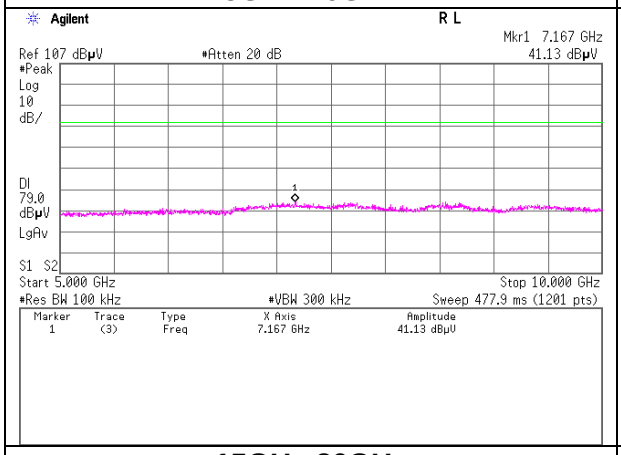
1GHz-5GHz



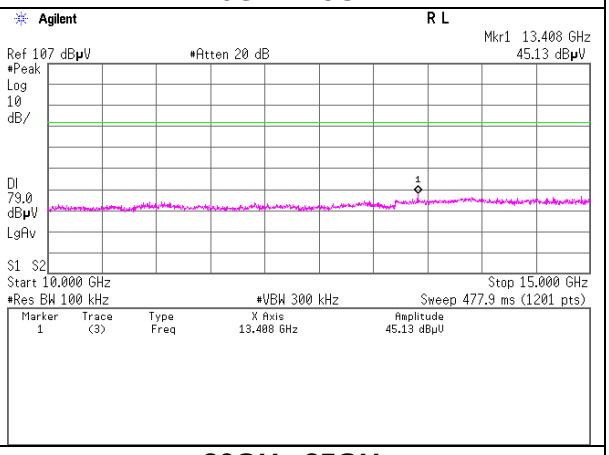
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Tx DH5 2441MHz

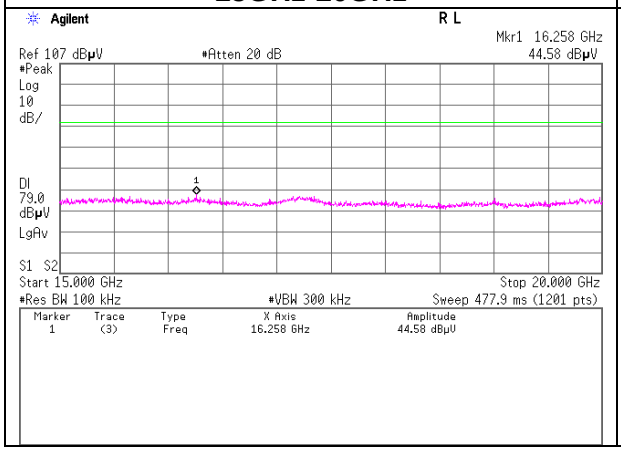
5GHz-10GHz



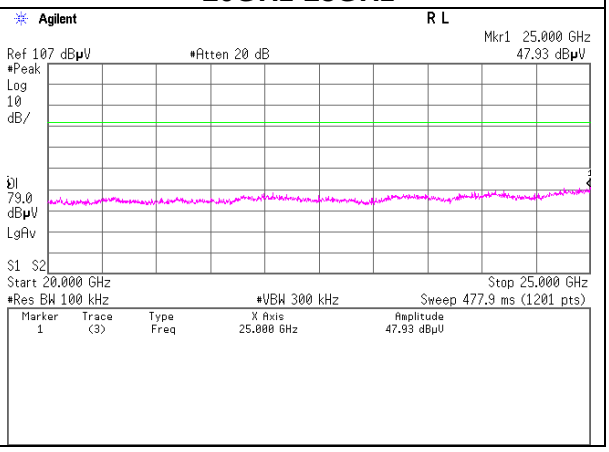
10GHz-15GHz



15GHz-20GHz

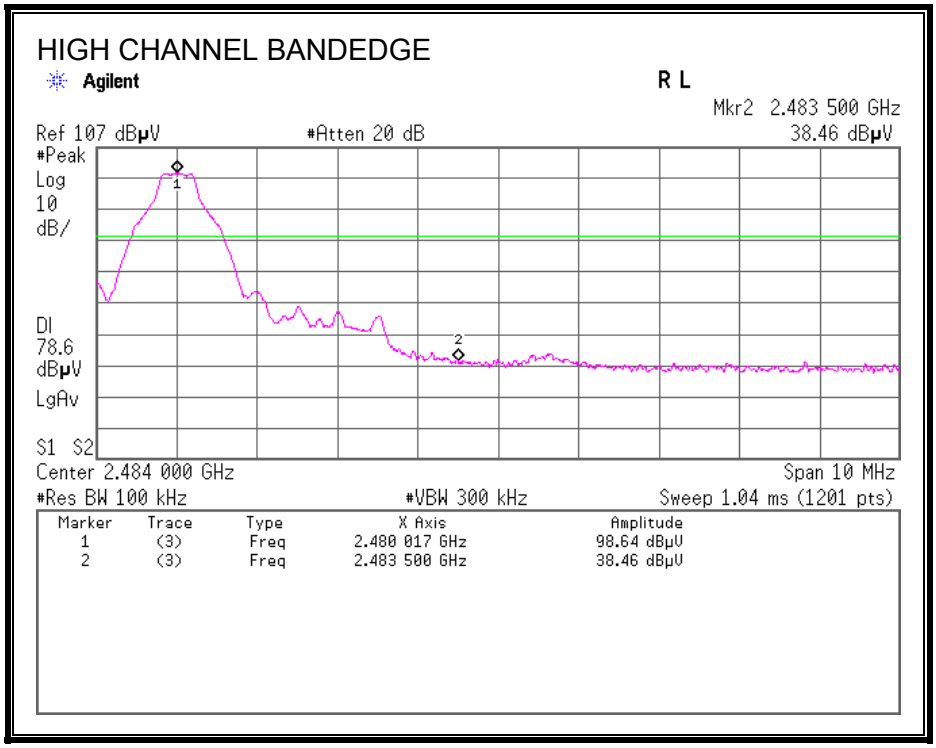


20GHz-25GHz



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

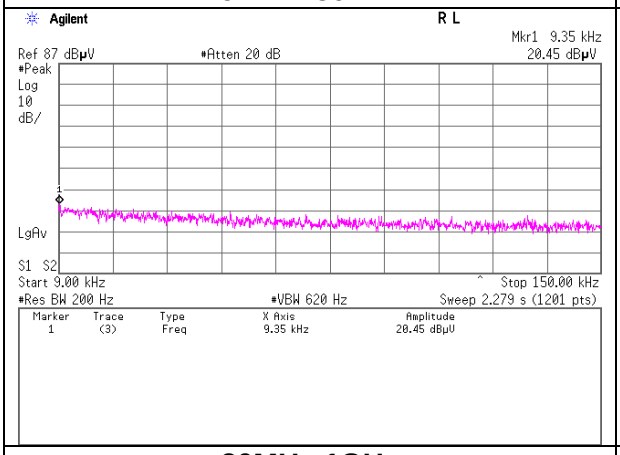
SPURIOUS EMISSIONS, HIGH CHANNEL



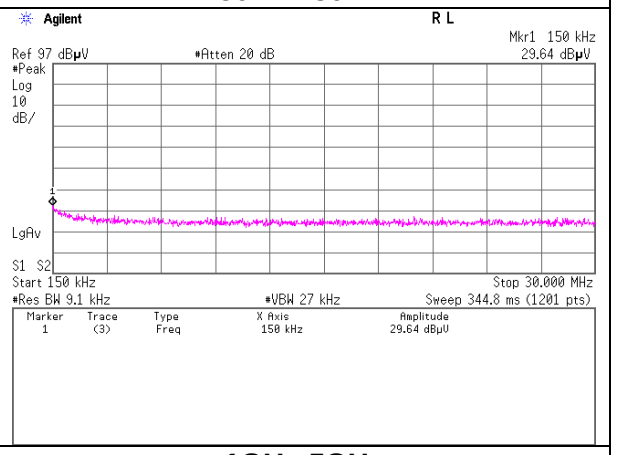
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Tx DH5 2480MHz

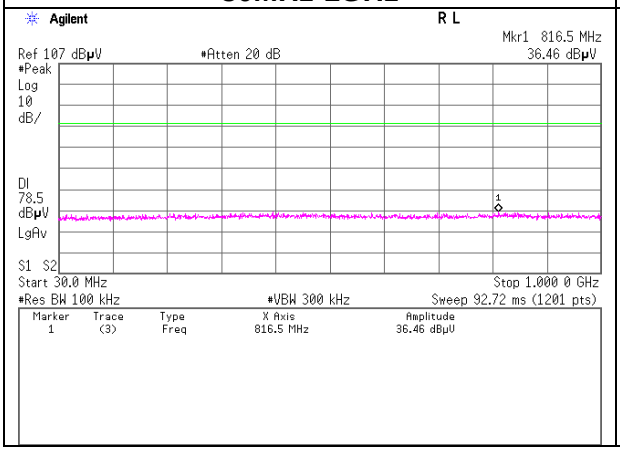
9kHz-150kHz



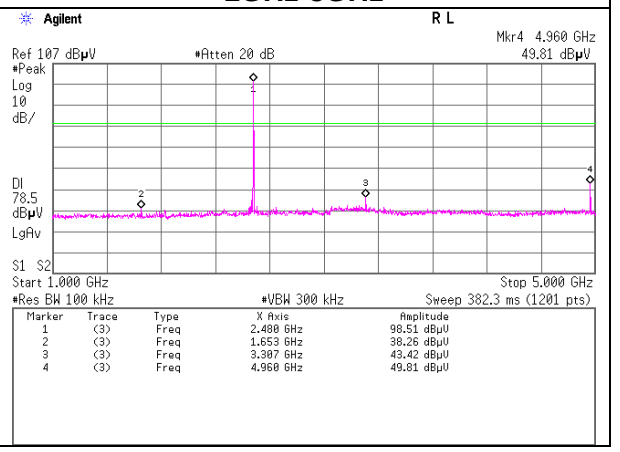
150kHz-30MHz



30MHz-1GHz



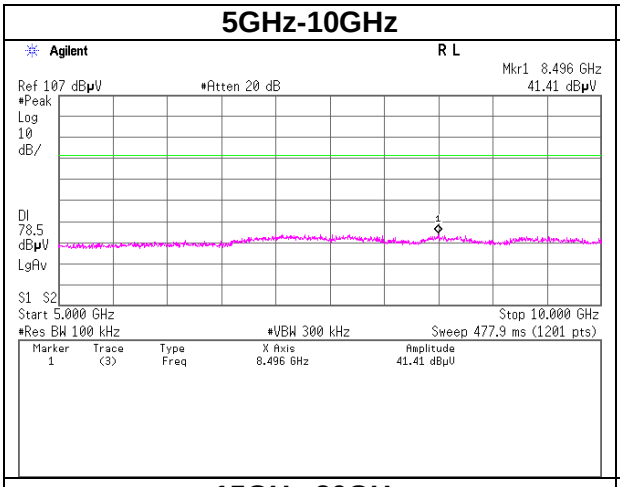
1GHz-5GHz



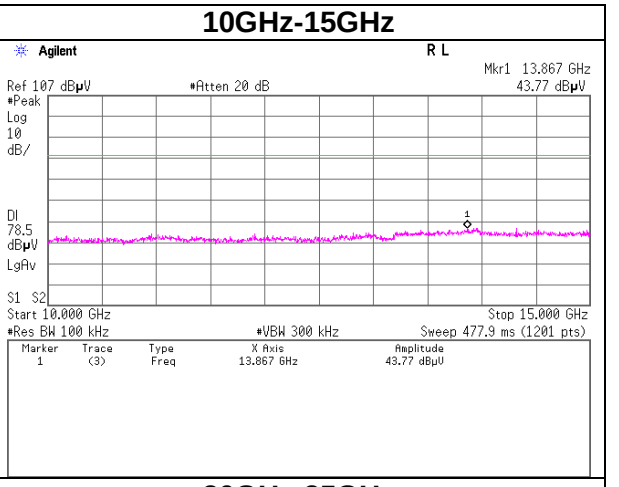
UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Tx DH5 2480MHz

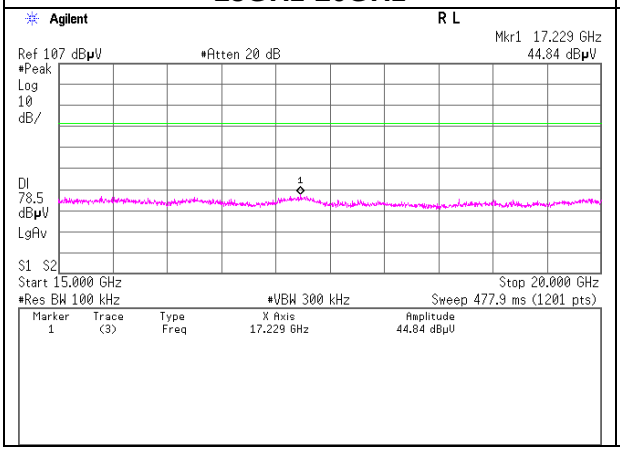
5GHz-10GHz



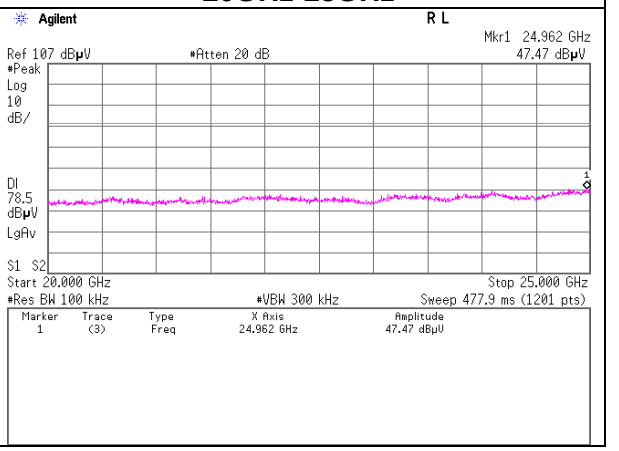
10GHz-15GHz



15GHz-20GHz

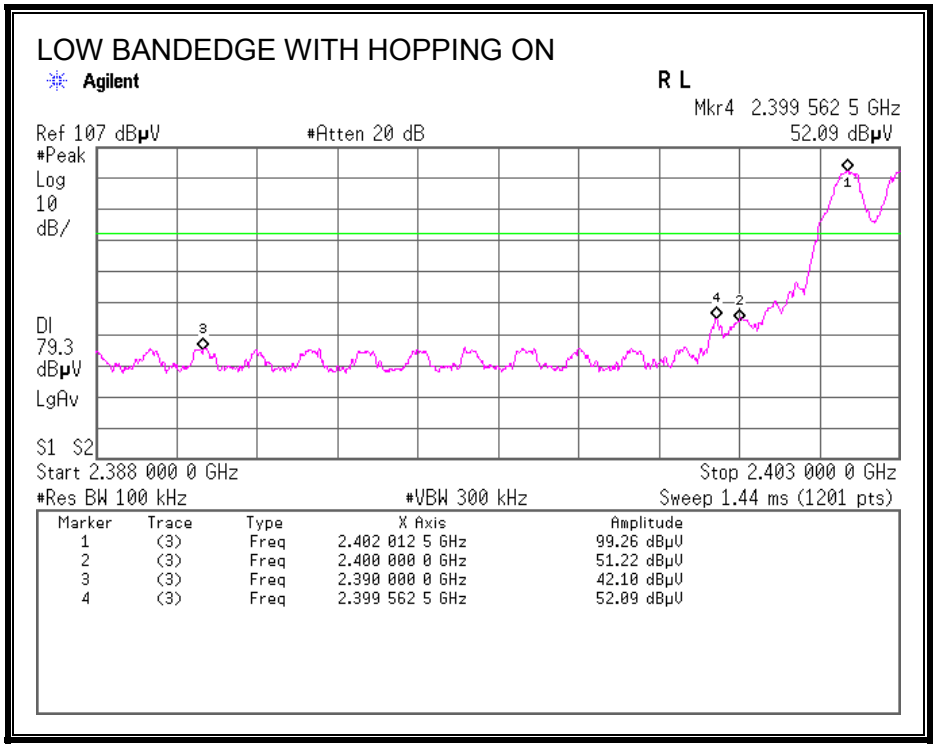


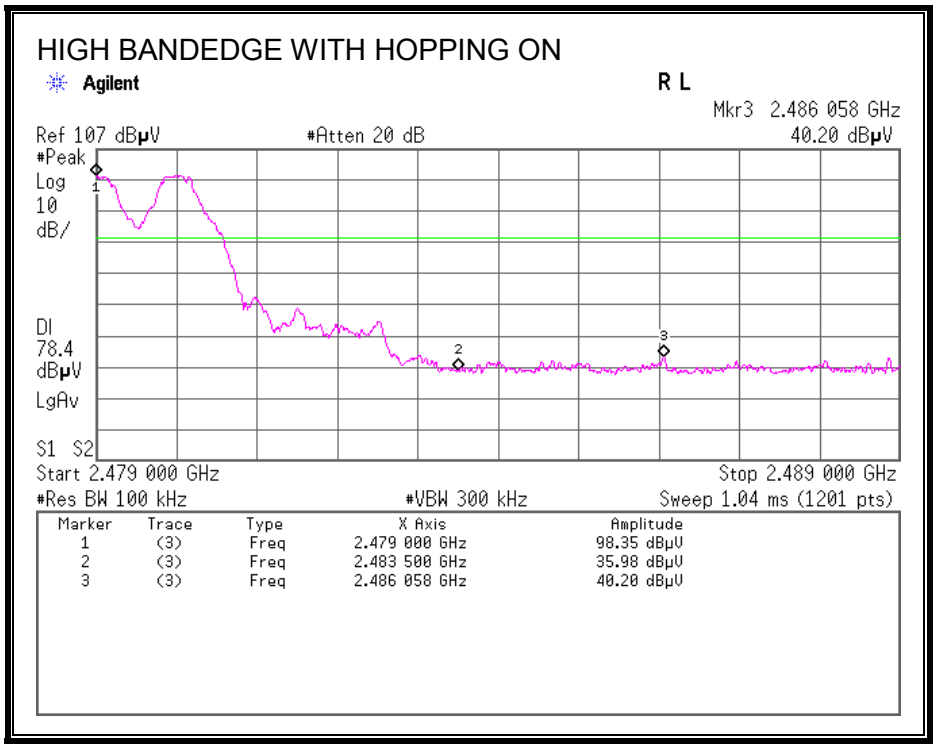
20GHz-25GHz



UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

7.2. TRANSMITTER RADIATED TEST RESULT (DH5)

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 and 3 Semi Anechoic Chamber	
Report No.	32JE0252-AP-01	
Date	06/21/2012	06/25/2012
Temperature/ Humidity	24 deg.C/ 64% RH	26 deg.C/ 48% RH
Engineer	Satofumi Matsuyama (Above 1GHz)	Satofumi Matsuyama (Below 1GHz)
Mode	Tx, DH5 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	95.993	QP	22.7	9.4	8.1	32.3	7.9	43.5	35.6	
Hori	250.084	QP	22.8	17.4	9.6	32.1	17.7	46.0	28.3	
Hori	1601.990	PK	49.5	25.5	2.0	33.2	43.8	73.9	30.1	
Hori	2390.000	PK	45.3	28.1	2.4	32.3	43.5	73.9	30.4	
Hori	4804.000	PK	43.5	31.2	4.3	31.5	47.5	73.9	26.4	
Hori	1601.990	AV	45.8	25.5	2.0	33.2	40.1	53.9	13.8	
Hori	2390.000	AV	32.6	28.1	2.4	32.3	30.8	53.9	23.1	
Hori	4804.000	AV	34.5	31.2	4.3	31.5	38.5	53.9	15.4	
Vert	95.997	QP	29.9	9.4	8.1	32.3	15.1	43.5	28.4	
Vert	249.992	QP	25.9	17.4	9.6	32.1	20.8	46.0	25.2	
Vert	1602.067	PK	51.4	25.5	2.0	33.2	45.7	73.9	28.2	
Vert	2390.000	PK	45.0	28.1	2.4	32.3	43.2	73.9	30.7	
Vert	4804.000	PK	44.6	31.2	4.3	31.5	48.6	73.9	25.3	
Vert	1602.067	AV	48.6	25.5	2.0	33.2	42.9	53.9	11.0	
Vert	2390.000	AV	32.2	28.1	2.4	32.3	30.4	53.9	23.5	
Vert	4804.000	AV	35.4	31.2	4.3	31.5	39.4	53.9	14.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	104.2	28.1	2.4	32.3	102.4	-	-	Carrier
Hori	2400.000	PK	59.6	28.1	2.4	32.3	57.8	82.4	24.6	
Vert	2402.000	PK	101.7	28.1	2.4	32.3	99.9	-	-	Carrier
Vert	2400.000	PK	58.1	28.1	2.4	32.3	56.3	79.9	23.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 and 3 Semi Anechoic Chamber	
Report No.	32JE0252-AP-01	
Date	06/21/2012	06/25/2012
Temperature/ Humidity	24 deg.C/ 64% RH	26 deg.C/ 48% RH
Engineer	Satofumi Matsuyama (Above 1GHz)	Satofumi Matsuyama (Below 1GHz)
Mode	Tx, DH5 2441MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	94.842	QP	22.8	9.2	8.1	32.3	7.8	43.5	35.7	
Hori	250.023	QP	22.9	17.4	9.6	32.1	17.8	46.0	28.2	
Hori	1626.686	PK	50.1	25.5	2.0	33.2	44.4	73.9	29.5	
Hori	4882.000	PK	44.9	31.4	4.3	31.5	49.1	73.9	24.8	
Hori	1626.686	AV	46.4	25.5	2.0	33.2	40.7	53.9	13.2	
Hori	4882.000	AV	35.0	31.4	4.3	31.5	39.2	53.9	14.7	
Vert	95.998	QP	29.8	9.4	8.1	32.3	15.0	43.5	28.5	
Vert	249.991	QP	26.0	17.4	9.6	32.1	20.9	46.0	25.1	
Vert	1626.498	PK	51.2	25.5	2.0	33.2	45.5	73.9	28.4	
Vert	4882.000	PK	46.6	31.4	4.3	31.5	50.8	73.9	23.1	
Vert	1626.498	AV	47.5	25.5	2.0	33.2	41.8	53.9	12.1	
Vert	4882.000	AV	37.5	31.4	4.3	31.5	41.7	53.9	12.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 and 3 Semi Anechoic Chamber	
Report No.	32JE0252-AP-01	
Date	06/21/2012	06/25/2012
Temperature/ Humidity	24 deg.C/ 64% RH	26 deg.C/ 48% RH
Engineer	Satofumi Matsuyama (Above 1GHz)	Satofumi Matsuyama (Below 1GHz)
Mode	Tx, DH5 2480MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	95.975	QP	22.7	9.4	8.1	32.3	7.9	43.5	35.6	
Hori	250.028	QP	23.0	17.4	9.6	32.1	17.9	46.0	28.1	
Hori	1652.678	PK	49.6	25.6	2.0	33.1	44.1	73.9	29.8	
Hori	2483.500	PK	50.1	28.5	2.4	32.2	48.8	73.9	25.1	
Hori	4960.000	PK	44.0	31.6	4.3	31.5	48.4	73.9	25.5	
Hori	1652.678	AV	45.3	25.6	2.0	33.1	39.8	53.9	14.1	
Hori	2483.500	AV	36.5	28.5	2.4	32.2	35.2	53.9	18.7	
Hori	4960.000	AV	35.6	31.6	4.3	31.5	40.0	53.9	13.9	
Vert	95.999	QP	29.7	9.4	8.1	32.3	14.9	43.5	28.6	
Vert	249.995	QP	25.8	17.4	9.6	32.1	20.7	46.0	25.3	
Vert	1652.710	PK	50.6	25.6	2.0	33.1	45.1	73.9	28.8	
Vert	2483.500	PK	49.2	28.5	2.4	32.2	47.9	73.9	26.0	
Vert	4960.000	PK	47.2	31.6	4.3	31.5	51.6	73.9	22.3	
Vert	1652.710	AV	47.5	25.6	2.0	33.1	42.0	53.9	11.9	
Vert	2483.500	AV	35.7	28.5	2.4	32.2	34.4	53.9	19.5	
Vert	4960.000	AV	37.8	31.6	4.3	31.5	42.2	53.9	11.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.

RESULTS

Conducted Emission

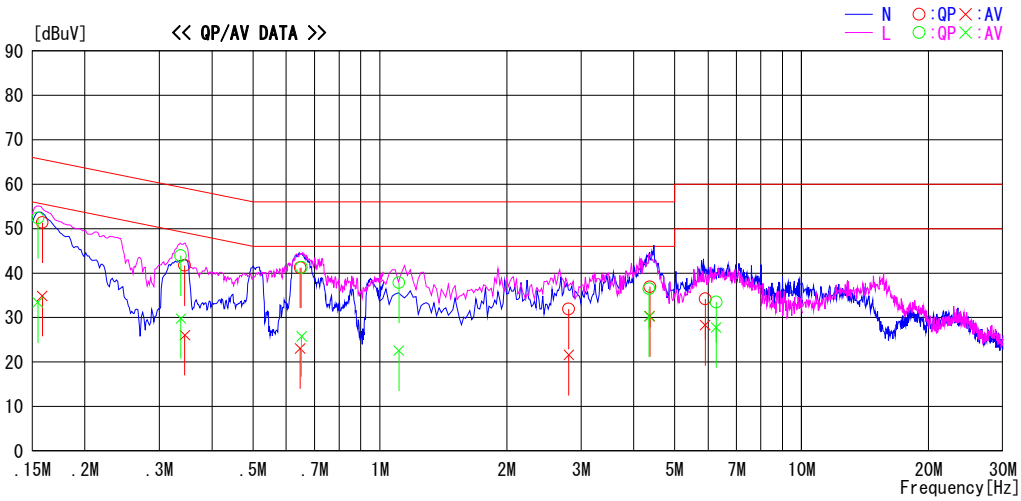
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/06/28

Report No. : 32JE0252-AP-01
Power : AC 120V / 60Hz
Temp./Humi. : 24deg. C / 51% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : BT Communication Mode

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15840	38.1	21.6	13.3	51.4	34.9	65.5	55.5	14.1	20.6	N	
0.34460	28.4	12.8	13.3	41.7	26.1	59.1	49.1	17.4	23.0	N	
0.64720	27.9	9.8	13.3	41.2	23.1	56.0	46.0	14.8	22.9	N	
2.80600	18.3	8.0	13.6	31.9	21.6	56.0	46.0	24.1	24.4	N	
4.36400	23.2	16.6	13.7	36.9	30.3	56.0	46.0	19.1	15.7	N	
5.90800	20.4	14.5	13.8	34.2	28.3	60.0	50.0	25.8	21.7	N	
0.15450	39.1	20.1	13.3	52.4	33.4	65.8	55.8	13.4	22.4	L	
0.33720	30.6	16.5	13.3	43.9	29.8	59.3	49.3	15.4	19.5	L	
0.65220	28.0	12.5	13.3	41.3	25.8	56.0	46.0	14.7	20.2	L	
1.10880	24.4	9.2	13.4	37.8	22.6	56.0	46.0	18.2	23.4	L	
4.35100	22.8	16.5	13.7	36.5	30.2	56.0	46.0	19.5	15.8	L	
6.27000	19.7	14.0	13.8	33.5	27.8	60.0	50.0	26.5	22.2	L	

CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

UL Japan, Inc. Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124
This report shall not be reproduced except in full, without the written approval of UL Japan, Inc.